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TITLE: THE EFFECTS OF CIGARETTE PAPER PERMEABILITY AND AIR DILUTION ON CARBON MONOXIDE PRODUCTION AND DIFFUSION FROM THE TOBACCO ROD

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ABSTRACT: A method for the direct measurement of CO diffusion through cigarette paper was developed. Diffusing gases from a lit cigarette were trapped in a plastic sample bag and subsequently analyzed on a non-dispersive infrared analyzer (NDIR) having a 0-2% CO range. Carbon monoxide diffusion measurements were made on non-filter cigarettes equipped with air-dilution mouthpieces. Mainstream CO, mouth-end dilution, and total dilution data were also obtained. It was found that on increasing mouth-end dilution to 77%, CO diffusion increased to 90% of the CO initially in the tobacco rod. The diffusion data were fitted by an exponential diffusion equation which included a wrapper dilution term in addition to the tobacco rod radius and length and linear smoke velocity. It was found that cigarette paper permeability over the range of 28-157 cm/min does not affect the extent of CO diffusion. Sidestream CO was determined by completely encapsulating a cigarette in a glass envelope. Air was fed to the envelope at a rate sufficient to maintain a correct puff count. The effluent was analyzed for CO with an on-line NDIR. While increased mouth-end dilution resulted in a small increase in sidestream CO, the total CO produced was reduced by up to 20%.

REVIEW: The diffusing gases of nonfiltered cigarettes (fitted with mouthpieces of varying degrees of dilution) were trapped in plastic sample bags and analyzed for CO. The authors found that:

1. The measured dilution was more than the air dilution alone, possibly due to CO diffusion from the tobacco rod.

2. Paper porosity has no effect on CO diffusion.

Sidestream CO was determined on line from cigarettes enclosed in a glass chamber. The sidestream smoke was swept with a flow of argon which would maintain the same puff count as for standard mainstream conditions. These data were then fitted to a series of exponential equations taking into account variables of the cigarettes and smoking conditions.

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